however, there is a great deal of truth in the dental origin of uveitis, is borne out by numerous observers. In the last meeting of the Eye and Ear Section of the San Francisco County Medical Society, Dr. W. F. Blake described a case in which relief of eye symptoms was quickly afforded by the opening of an apical abscess. Todd and de Schweinitz report several similar cases, in which the opening and sterilization of small abscesses at the roots of the teeth gave cause to the recurrences of iritis. Already in 1879 Nettleship pointed to diseased teeth as the possible origin of uveitis, and Lang thought that pyorrhœa alveolaris was the source of sepsis in one hundred and thirty-nine cases out of two hundred and fifteen cases of eye inflammations attributable to sepsis.

There is a rather lowly disturbing factor in these considerations, and that is the matter of money. To arrive at a correct diagnosis means that the patient must pass through several hands. Our collaborators in the laboratory, while great sticklers for scientific precision and accurate findings, are not in the field for glory alone. A thorough examination is, therefore, restricted to institutional and well-to-do patients. For the person of moderate means, the other expenses of sickness, the loss of work, etc., make such an expensive procedure a thing almost unattainable.

Discussion.

M. W. Ward, M. D.: Ten years ago yesterday I read a paper before this section of the State Society, touching on the subject now before us, under the head of "General Diseases as a Cause of Diseases of the Eye." My paper was the only one that was presented before this section at that meeting that was saved from destruction by the "quake," due to the fact that I had not turned it over to the secretary that day.

In that paper I made the statement that three-fourths of all diseases of the iris, ciliary body and choroid, or in other words, three-fourths of all diseases of the uvea were due to syphilis, inherited or acquired. Three-fourths of the remainder due to gout and rheumatism and the balance to toxic and other causes such as gonorrhea, etc.

That was the teaching at that time and I would like to hear it compared with the teaching of to-day.

V. H. Hulen, M. D.: I should like to mention just one point in the modern treatment of iritis not referred to or not read by Dr. Fredrick, illustrated by a case I saw recently in consultation with two other physicians. The patient was suffering from an acute and extremely severe case of uveitis. By exclusion a bad tooth was suspected as the inciting cause. A dentist confirmed our suspicion and treatment of the diseased tooth was followed by a fairly magical recovery of the eye which had seemed almost on the point of disintegration.

H. G. Thomas, M. D.: We are inclined to find one cause and stop with that. Dr. E. V. L. Brown of Chicago reports a case which had recurring attacks of iritis in which they found lues, old gonorrheal infection, a tubercular condition, and an especially nasty condition of pyorrhoea.

In our clinic in Oakland we scan each case carefully and find a great many due to pyorrhea. Dr. Fredrick has combed the whole situation thoroughly and has searched for the focal infection in all of the cases.

M. W. Fredrick, M. D., closing: In regard to the percentage of cases of iritis, the statistics vary greatly; however, in all statistics a large percentage are due to syphilis, a smaller proportion to tubercular infection, while a relatively large number are due to gonorrhea. I tried to impress it upon you that we are not to accept the diagnosis of rheumatism in regard to iritis any more, but we must look for a focus.

As to the kind of vaccine I use, I find in gonorrheal cases that the mixed-Neisser works very well. The autogenous vaccines are very good if you have the time and can find the material to culture it from.

I take exceptions to Dr. Thomas' statement that I have combed the whole situation with a fine-toothed comb. I have merely raked it over lightly. Dr. Blake, in a recent meeting of the San Francisco County Medical Society, recited a case in which a man had a tooth extracted and recovered from a persistent eye trouble. Black tells us that 50% have pus in the teeth, either at the apices of the teeth or alongside the teeth. The point that should be made here is that even though you do find one symptom you should not be satisfied with that alone, but should look the case over thoroughly and find every possible focus of infection. Treatment of the other foci of infection will cause a subsidence of the prominent symptom.

THE EARLY SURGICAL TREATMENT OF SQUINT.*

By VARD H. HULEN, A.M., M.D., F.A.C.S.,
San Francisco.

For many years the importance of beginning the treatment of squinting children as soon as the diagnosis can be made has been recognized. To Claud Worth great credit must be given for the prominence and importance of the early development of vision, and fusion faculty in cross-eyed infants. Much good has been accomplished by the early non-surgical treatment advocated, but I believe it a mistake, when squint cases are not thus cured, to postpone the surgical treatment until the patient has passed the age of six or seven years, as has been rather generally advocated. Dr. Reber, in the *Pennsylvania Med. Journal* for May, 1915, says: "14 to 16 years is the ideal age to operate squint." We agree that surgery must be the last resort, but this should not mean that it may be postponed indefinitely. It is just as grave a mistake to begin the surgical treatment too late, as it is to postpone the non-surgical treatment.

To review briefly the handling of squint, in the case of a young child, and by squint I mean all varieties of constant strabismus though in this article I shall have cross-eyes especially in mind. First, the error of refraction must be carefully estimated, and fully correcting lenses prescribed. This can be done when the patient is as young as six months of age or even earlier. Then the amblyopia, if any, must be detected and every effort given to the development of vision in the defective eye by means of atropin and the exclusion methods for the other eye. This may occupy us until the child is three or four years old. At this age we are usually able to determine the absence of the "fusion faculty." Then a few weeks of

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intelligent and persistent efforts with the amblyscope, stereoscope, diploscope and bar reading should fully develop binocular vision if such is possible. By giving such prompt and consistent attention to young squinters, we usually have exhausted the possibilities of non-surgical treatment some time before the child has reached the age of six years. If the patient has ceased to show any improvement, and still squints, I would advocate prompt operation. As a rule alternating strabismus should be operated upon at first sight. Again, when the vision has been corrected as far as possible, but no fusion power can be acquired, the sooner we operate the better, hoping by the parallelism thus attainable that the normal functions of the eye may be developed before it is too late. Or where no effect has been secured by a fair trial of all non-surgical treatment, I would advocate operation without delay, regardless of the youthfulness of the child. To dally along until the age for obtaining binocular vision has passed is to me unthinkable.

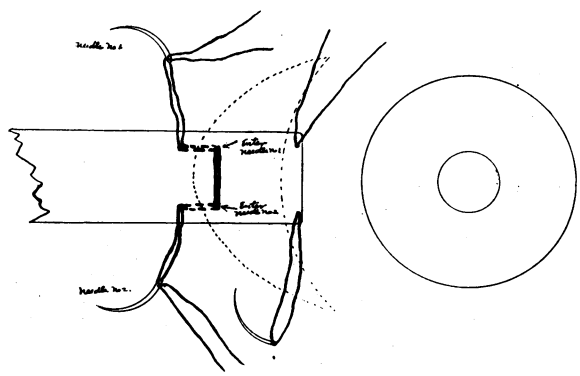
In no case am I able to see serious objection to a resort to surgery no matter how young the child, provided correct and complete non-surgical treatment has been previously given, and I am convinced that it is a highly desirable thing to obtain parallelism before the developing period for the eye has passed. We should not permit the parents of the child to postpone correct operative procedures indefinitely as so often occurs.

This early surgical treatment, in my opinion, can be safely done only by some form of "tendon tucking." Tenotomy is certainly not advisable in these immature cases, and no method of advancement, or shortening, is entirely safe whereby the tendon is cut loose from its attachment to the globe.

My method in these cases of very young children, or when the muscle is especially small, is quite similar to the one I described in the *Journal of the American Medical Association* for July 9, 1910, page 123, for shortening or advancing an ocular muscle. A reading of that article is necessary for a full understanding of the details and advantages of this modification. A general anesthetic being necessary in all very young patients the reserve sutures (first used as tractors) are exceptionally necessary here for the best results.

Reference to the two accompanying diagrammatic illustrations will render much description of the technique of this operation unnecessary. Instruments required: a speculum, tenotomy scissors, muscle advancement forceps, fixation forceps, tenotomy hook (with straight right-angle), needle-holder, and two separate sutures. One suture of No. 6 black iron-dyed twisted silk, 18 inches in length, with No. 26 full curved sharp, flat needle threaded to its middle; the second suture should be a double one, composed of a white and black No. 6 silk, each end of which is threaded into one needle, making a double suture 14 inches long with a needle at either end.

The speculum is introduced, the assistant brings the operative field to the front. Conjunctiva and tissues down to the tendon are pinched up, incised vertically just posteriorly to the insertion of the tendon, the incision is extended upwards and downwards. It is usually advisable to excise a crescentic piece of this covering to the muscle. These tissues are separated towards the cornea and also freely in the opposite direction. Next the tendon is loosened along the upper and lower margins and clamped close to its scleral insertion with the muscle forceps, the better to control the globe while accurately placing the scleral stitch vertically as shown in figure one, the black suture with the single needle is used. In extreme cases I insert this suture in the sclera close to the limbus, sometimes making a double entrance as it were to broaden its bite. In most cases it is passed firmly into the tendon insertion. In making this stitch, the conjunctiva is first entered above from without inwards then into sclera and out through conjunctiva below. Draw the suture through to its middle and cut off the needle.



To insert the muscle suture take off the clamp, the assistant lifts up the muscle on the hook, fix one needle of the black and white suture in the holder and penetrate the muscle at one-third its width from the upper edge from without inwards 4 mm. anterior to the point we intend to bring forward to its final fixing point, and draw the suture through to its middle; with the same needle again enter the muscle from within outward four millimeters directly back of its first insertion, come out picking up tendon, capsule and conjunctiva over site of exit. Now take the other needle of this same suture, and duplicate this stitch through the lower edge of the muscle (see Fig. 1), and slip off the needles.

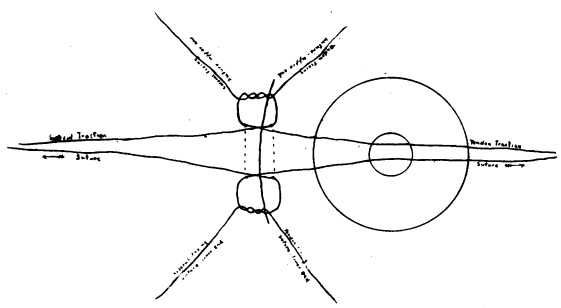
It is evident that we now have two separate sutures, in same insertions in sclera, and also in the muscular tissues. One from each of these is crossed and used on this occasion as traction sutures only. By use of them the assistant has perfect control of the relative position of globe and muscle, and when he has brought the eye to the exact position required, the operator ties the upper ends of the other pair together, and then the lower ends together, making the fixation perfect (see Fig. 2), and the muscle has thereby been folded smoothly on itself.

The traction sutures are left in situ at least until the following day. Then if the squint has been found on recovery of consciousness to have been materially over-corrected, the tied sutures may be easily removed, and remaining traction sutures similarly tied to hold the correct position.

In suitable cases both eyes may preferably and safely be treated surgically at the same operation.

In my operation as described six years ago, the muscle suture had traction on but one thickness of the muscle, and I have rarely found any giving of the tissues, but at least one writer, Dr. Wm. F. Hardy, in the *American Journal of Ophthalmology* for December, 1915, page 353, speaks of this possibility. The doubling in the modification just described, is but little more complicated and eliminates any such objection.

Many details and practical points are here omitted, as they are common in all similar proceedings or are self-evident.



For brevity I have confined this contribution to two points. First, to lay stress on the desirability of operating on certain squint cases early, certainly before the age of six years, in fact at any age after the non-surgical treatment has been conscientiously and adequately employed to the point of no further progress. Remembering that the time for obtaining the valuable binocular vision is usually limited to the first five or six years of life. This, so far as I know, has not been definitely advocated before. And, secondly, to describe a simple, accurate and efficient operation for safe use in these cases.

Discussion.

Wm. H. Dudley, M. D.: I have used various operations in the last twenty years. The Knapp operation was used mostly in the hospital and usually the results were very good. Once in a while, however, there was an under-correction or an over-correction. The operation according to Worth, I have found, more satisfactory and have used it for quite a number of years and like it very much, but on reading the previous discussion of Dr. Hulen's operation, I was very much attracted to it. It seems to me that his tuck in the tendon has advantage in certain ways, over any tucking operations I have seen. The retaining suture which he has, is an advantage, as he can adjust the muscles after a few days, and on that account is better than any other I know of. Under ether the eye stands anyway after the operation, but if we have an arrangement by which you can adjust the muscles later, when the patient is conscious and the eye assumes its proper position, then I think we have an element in this operation that stands ahead of anything I have seen.

The Todd tucking operation, which has been used so extensively, for many years, leaves the tuck standing out, and requires much more time to become absorbed than Dr. Hulen's tuck which lies buried beneath the shortened tendon.

H. G. Thomas, M. D.: We will look back a few years, and remember the bad results of practically all the old tenotomies, we will understand why the modern methods of tendon advancement are slow in being taken up, and recommended by the general men, because so many of the over results of the old tenotomies are still with us. So, therefore, I think we should not blame any one, or call them criminally careless, because the specialists have not taught tendon advancement long enough.

The main idea to-day is the early operation, which I believe in and advise. Dr. Hulen's operation is a marvel of ingenuity, but if you have seen the O'Connor operation you have seen the simplicity of it. There are no stitches to be removed at all.

Kaspar Pischel, M. D.: I would like to ask one question. What becomes of the tucked tendon? Have no experiments been made upon animals to find out the ultimate anatomical result of tucking of tendons?

Closing Remarks: V. H. Hulen, M. D.: While Dr. O'Connor's operation is original and very ingenious I cannot think of it as a practical operation for accuracy in execution or safety in estimating results, requirements so necessary in squint and all ocular muscle work. One can get a beautiful demonstration on a broad and fixed object like a saddle girth of this twisting or quilting suture, but when we have to deal with small, narrow ocular muscles with their varying tensions and fragility, Dr. O'Connor's suture would surely be extremely difficult to place and definite results in many cases it would seem to me, to be out of the question. Also my experience with catgut in eye muscle work has been most unsatisfactory.

Roderic O'Connor, M. D.: In regard to irritation by catgut, I used chromic catgut in one case and the resulting reaction was extremely severe and lasted several weeks. For that reason I always use Lukens' 20-day tanned non-iodized gut. Plain gut would probably remain long enough to answer all purposes, but I have never tried it.

As to looping the tendon, I do not loop the entire tendon, but only a narrow band on each margin, which, together, are strong enough to take the full action of the muscle during the healing period, and so relieve the suture holding, the remaining central section from all tension, thus preventing any loss in effect from cutting through of the sutures, so common in all other methods. There is nothing to fear from an over-correction, for the two opponents are now strong, and by pulling in directions diagonal to each other, the globe is acted upon on the principle of the parallelogram of forces, and recedes into the orbit compressing the orbital fat, till a point of balance, determined I believe, by the desire for binocular vision, is reached. Many of my cases show an immediate under effect, but in practically all, this disappears, and it increases during the healing period. I explain this as due to temporary paresis from stretching, not relieved by a tenotomy of the opponent. As the opponent gives way to the increased tension of the operated muscle, and as the latter regains its power, the effect naturally increases. The point of the operation is, that it does away with all constriction, with the attendant cutting and loss, unavoidable in all the methods depending upon sutures and ligatures.